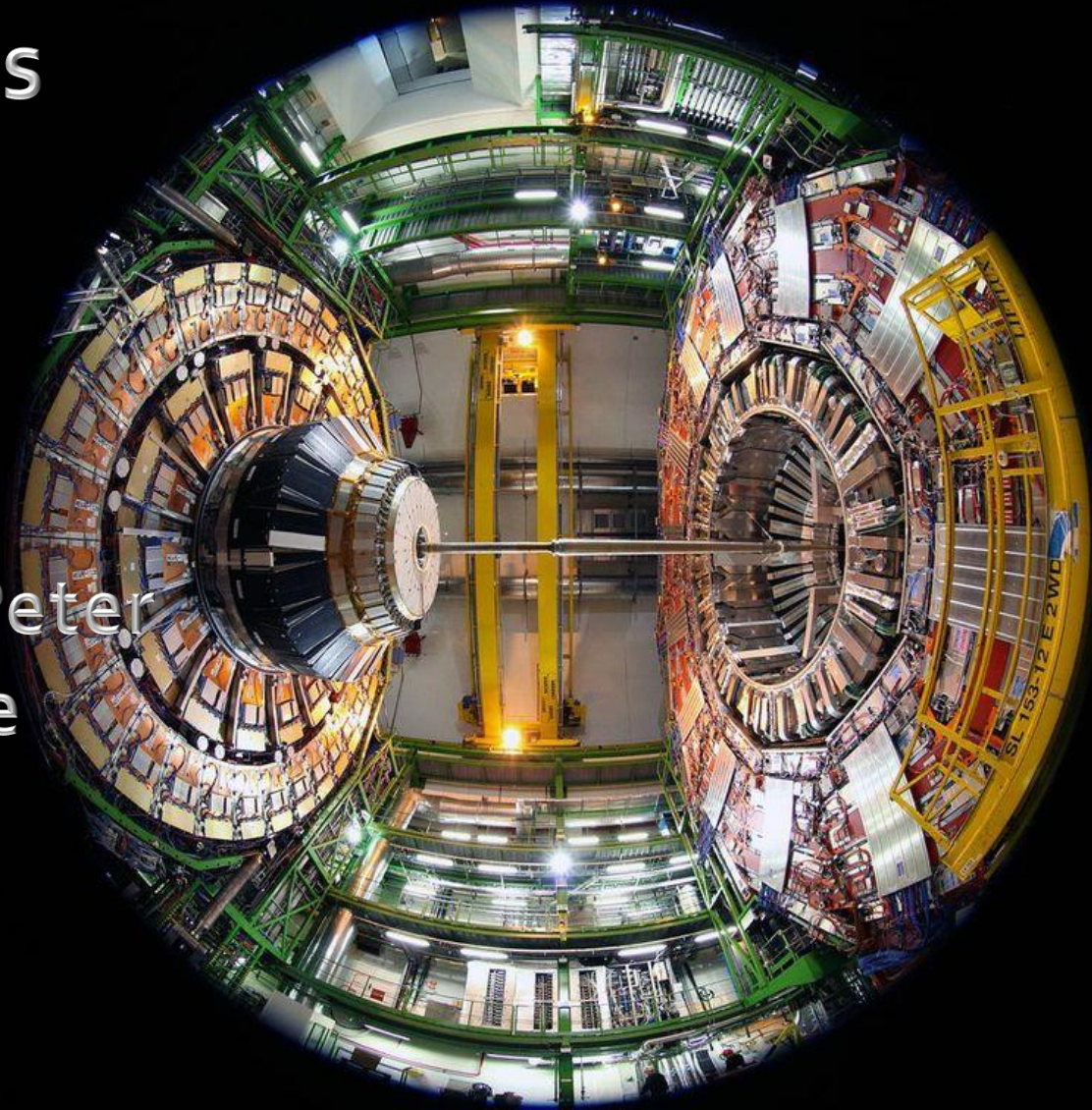


CMS Software

Status and Plans

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LHCC Meeting
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CMSSW release plans

- CMSSW_7_1_0 release: 17 June 2014
 - Usage:
 - Generation and Simulation samples for run 2 startup
 - Limited digitization and reconstruction reprocessing, post-CSA14
 - Mid-week global runs starting in July
 - Major new features:
 - Finalized simulation geometry for the 2015 CMS detector
 - Integration of **GEANT 4.10**
 - Deployment of the **multi-threaded CMSSW framework**
 - Significant progress in moving to ROOT 6, however it is not yet thread-safe.
- CMSSW_7_2_0 release: 24 November 2014
 - Usage:
 - Digitization and reconstruction for run 2 startup



Multi-threaded framework

- Goal for phase 1:
 - Using 4 threads in a single process achieve roughly the same throughput as 4 processes running on four cores, BUT with much less memory, resulting in much easier computing operations.
 - In a multi-core era where sufficient memory per core is available to process an entire event this is all we need.
 - Recently: major progress in percentage of compliant reconstruction code
 - In a 4-core job, reconstruction workflows now achieve a 200-300% throughput increase relative to a single threaded application with only 30-40% increase in RSS size.
- Goal for phase 2:
 - Once many-core solutions are required, we will aim to deploy finer-grained parallelism which could achieve better throughput compared to multiple processes and reduction of long tails.



Also In the Next Release

- Adoption of Geant 4.10
 - In the beginning of Mar. we made a build of Geant 4.10 for testing
 - A quick validation showed no major problems so we have moved to it as default for more intense validation
 - Depending on physics process we get a 17-30% speedup
- New scheme of mixing for pileup
 - Create a pileup dataset that contains the correct pileup distribution (25ns vs. 50ns, correct mu) once and reuse it for multiple signal samples
 - Plan to use this scheme in CSA14 for the most challenging PU scheme of 25ns and mu of 40
- Many improvements in the reconstruction
- MiniAOD, 10 times smaller than the AOD
 - benefits from the lessons learned from run 1



About the future

- There is a significant effort in R&D
 - More details are available in the slide presented at the last meeting in the backup
- Many of us in CMS are very interest in collaboration with the HEP Software Foundation and have contributed white papers.



- Backup



R+D towards future architectures

- Issues driving CMSSW
 - Technology evolution is a driver for change in CMSSW for the medium/long term
 - How to improve performance and scalability in throughput/cost for future
 - How to make continued efficient use of existing resources and open possibilities to access additional resources (e.g., HPC)
- Taking first steps to setup software environment for development
 - Building demonstrators within for software components on new architectures (GPU, ARM, Xeon Phi, etc)
 - Moving standalone development into CMS environment to ease cost of entry for collaboration involvement
 - Incorporating infrastructure into CMSSW: profilers, software development tools, etc for new architectures
 - Developing reconstruction algorithms for high-pileup; Tracking algorithms designed for many-core resources

This work is focused in longer term (after Run 2), and is an area to build collaborations (e.g., via the upcoming software collaboration workshop)